



## UDAF

### Insect Program 2008 :

- ◆ Administered nine insect and plant quarantines.
- ◆ Issued 1365 Phytosanitary Certificates (182 State, 1156 Federal, 27 Processed Products).
- ◆ Placed and monitored 6,866 insect traps.
- ◆ Surveyed 3,260 locations statewide.
- ◆ Collected and identified over 10,000 insect specimens.
- ◆ Serviced over 200 walk-in and telephone insect inquiries.

### Summary of Invasive and Native Pests Risk

Africanized Honey Bee	Potential to disrupt Utah's \$1.1 million honey industry, health risks to humans and livestock
Apple Maggot and Cherry Fruit Fly	Fruit industry pest, potential to devastate Utah's \$18 million fruit industry
Cereal Leaf Beetle	Potential to reduce Utah's \$343.3 million small grain and field crop industry
European Corn Borer	Potential to devastate Utah's \$31.5 million corn harvest
Exotic Wood Borers	Threat to Utah's \$329 million wood products and \$43 million ornamentals industry
False Codling Moth	Potential to cause significant damage to Utah's \$18 million fruit industry
Gypsy Moth (Euro, Asian, Pink)	Potential to destroy Utah's watersheds, forests, and residential landscapes
Japanese Beetle	Potential to damage Utah's \$20 million sod industry, \$124 million nursery and floriculture industry, and \$18 million fruit industry
Mormon Cricket and Grasshopper	Potential to significantly reduce Utah's \$343.3 million forage crop industry
Red Imported Fire Ant	Economic damage caused in the US exceeds \$5 billion, public health risk
Siberian Silk Moth, Nun Moth	Threat to Utah's coniferous forests

Cover photo: *Bombus griseocollis* approaching *Hedysarum boreale* (northern sweetvetch), by James Strange.

# PROTECTING UTAH'S AGRICULTURE



**2008 Insect Report**  
**Utah Department of Agriculture**  
**and Food**  
**Plant Industry**  
**Clair Allen, Director**  
<http://ag.utah.gov>

### **Protecting Utah Agriculture**

Utah agricultural industries are valued at over a billion dollars annually, with about 22% of the state's land in agricultural production. The mission of the Utah Department Agriculture and Food is to "Promote the healthy growth of Utah agriculture, conserve our natural resources and protect our food supply". Managing insects is essential to this mission. Although the vast majority of insects are beneficial, pest infestations can be devastating and UDAF has been addressing insect issues since pioneer agriculture began here 160 years ago. Some economic estimates of losses to U.S. food crops due to pests approach 40%. Both newly introduced insects and outbreaks of endemic species can cause sudden losses much like natural disaster. Trends that contribute to this potential include erratic weather patterns and climate change, intensive monocultural farming methods and global commerce which commonly transports materials of risk great distances. The UDAF Insect Program aims to protect Utah agriculture, food and quality of life from losses due to insects.

### **Goals and Strategies of the Insect Program**

#### *Prevention and Protection*

Insects are transported in various ways, often unintentionally. Using quarantines and inspections can guard against new pests. Surveillance of insects with outbreak potential allows protection of resources at risk.

#### *Early Detection*

Using strategic detection and diagnostic networks, trap and survey technology to detect pests as early as possible minimizes insect damage and cost of eradication or control. UDAF surveys and traps over 10,000 locations statewide each year and works with partners nationwide to best use these tools.

#### *Insect Control*

There are many effective tools for insect control and more being developed. UDAF uses survey methods, predictive models and economic thresholds that inform action using chemical pesticides, biocontrols or cultural methods.

#### *Public Education*

Raising awareness of how insect pests are introduced and the consequences of outbreaks can facilitate early detection efforts and protect resources. Teaching Integrated Pest Management principles can also help protect beneficial insects and increase environmental stewardship.

### **Accomplishments and Highlights**

The UDAF insect program has been highly effective at detecting insect problems and taking appropriate action. Currently nine insect and plant quarantines in conjunction with trapping and inspection programs have prevented pests such as European Corn Borer and Red Imported Fireant from inhabiting Utah. UDAF monitors endemic populations of grasshoppers and Mormon crickets to suppress outbreaks and protect crops. Exotic pest introductions with high economic potential have been met with treatment programs to eradicate, including the Gypsy moth (successfully eradicated) and Japanese Beetle (in progress).

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### **UDAF Thanks Partners of the Insect Program:**

USDA APHIS Plant Pest Quarantine  
USU Plant Pest Diagnostics Lab  
Dept Homeland Security USCIS  
DWR State Lands and Forestry  
National Plant Board  
National Plant Diagnostics Network  
State Departments of Agriculture  
USDA FS Forest Health Protection  
Utah Nursery and Landscape Association





### Red Imported Fire Ant

The red imported fire ant (RIFA) is both a public health risk and an economic threat. It is a federally quarantined pest not known to occur in Utah, but easily introduced by infested soil. It is also in neighboring southern states, and adults migrate by flying to new territory. Imported fire ants were first introduced to the southern United States in the 1930's from South America. They can feed on many agricultural crops, including corn, soybean and fruit trees. Established ant mounds have more than 200,000 members and can reach over two feet high. The above ground mounds make cultivation, irrigation and harvesting almost impossible. Imported fire ants can infest urban areas and become a nuisance that deters outside activity. Golf courses, parks and private homes can be devastated by permanent damage to turf and woody ornamental plants. Not only are imported fire ant mounds unattractive, but ants are aggressive and sting humans and other animals. UDAF uses quarantine enforcements, port of entry inspections and public education to keep Utah free of imported fire ants. Annual surveys to detect introductions of *Solenopsis invicta* (RIFA), and the black imported fire ant, *S. richteri* (BIFA), focus on Washington County, the most suitable climate and habitat in Utah.

Using pit fall traps, 13 parks were sampled in Washington County over four dates. Neither species of imported fire ant was detected. In addition, native ant species were present at most of these locations. Imported fire ants are known to compete for territory and displace native ants, so this is further evidence that Utah remains free of imported fireants.

## Table of Contents

Program Goals and Strategies.....	2
Africanized Honey Bee .....	4
Apiary Program.....	5
Apple Maggot/Cherry Fruit Fly.....	6
Asian Defoliator.....	7
Cereal Leaf Beetle.....	8
Emerald Ash Borer.....	9
European Corn Borer.....	10
Exotic Pest Detection.....	11
Exotic Wood Borer and Bark Beetles.....	12
False Codling Moth.....	13
Gypsy Moth.....	14
Japanese Beetle.....	15
Light Brown Apple Moth.....	16
Mormon Cricket and Grasshopper.....	17
Red Imported Fire Ant.....	18
Staff, Cooperators, Contact.....	19
Summary of Risks.....	20



Top Photos: Danielle Downey, UDAF

Spread of Africanized honey bees by year, by county

First found in southern Texas in 1990, Africanized honey bees are now found in much of the South.



Arx.usda.gov

## Africanized Honey Bee (AHB)

Honey bees were brought from Europe to North America for honey and wax, and since then they have assumed a critical role in agricultural production as pollinators. The African bee is the same species but a different race than these European bees. AHB was introduced to Brazil in 1956 and has been migrating north since, arriving in Texas in 1990. Although individual bees are the same, AHB colonies are not adapted to cold winters, they will nest in almost any cavity, and they have a more severe group stinging defense. People or animals in AHB stinging events can rapidly suffer hundreds of stings. AHB presents safety risks to the public and management challenges to beekeepers. Even so, this insect has been unfairly sensationalized in the media, and education efforts have decreased panic and stinging incidents. UDAF has maintained detection traps in the Southern part of Utah for over a decade. AHB entered Nevada and Arizona by 2000, but bees trapped in Utah were all European until this year, when it was detected in Washington and Kane Counties. In 2008, UDAF collected nearly 70 samples from managed bee colonies and trapped feral swarms. Of these, three feral and four managed colonies were Africanized. All were destroyed. UDAF will continue to educate the general public and beekeepers about the presence and risks of AHB. Beekeepers are the main line of defense against AHB spread, because they can maintain gentle stocks to occupy bee habitat, and they can detect and destroy aggressive bees and feral bees of unknown stock, keeping AHB levels low in Utah.

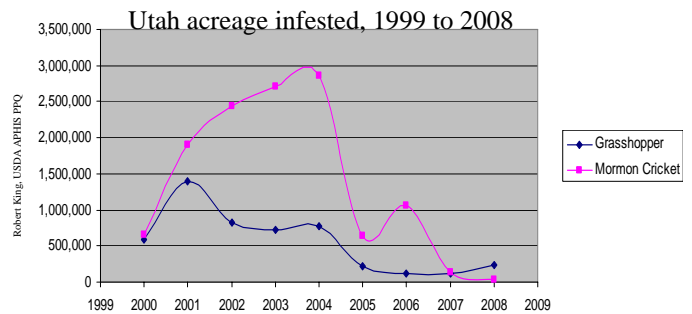


Photo: UDAF

Photo: Russ Ottens, Bugwood.org

Photo: Michael Thompson, ARS.USDA.gov

Photo: UDAF



## Mormon Cricket and Grasshopper (MCGH)

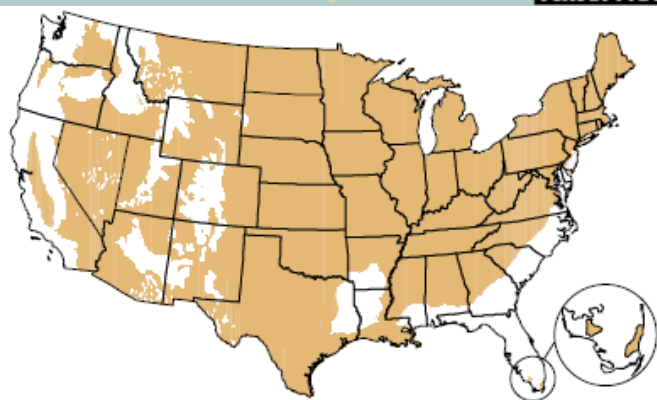
Grasshoppers and Mormon crickets (*Anabrus simplex*) are members of the native ecosystems of the U.S. They play an important role as food for wildlife and cycling nutrients on rangelands. The two major grasshopper species affecting Utah croplands are the two-striped grasshopper (*Melanoplus bivittatus*) and the red-legged grasshopper (*Melanoplus femurrubrum*). Grasshopper and Mormon cricket outbreaks occur throughout the west, and have been controlled in Utah since 1848. Utah's forage crop industry is valued at \$343 million. Mormon crickets are flightless katydids, during outbreaks they create migratory bands and "march" across rangelands. At very high population densities they damage rangeland, but they also enter and devour cultivated crops. Mild winters and hot, dry weather speed development and increases populations while reducing bird and rodent predators and fungal insect diseases. UDAF cooperates with USDA/APHIS-PPQ to survey and control MCGH in all counties.

Grasshopper overall infestation acreage increased by 106% since 2007. Total infested acreage statewide was 231,864 acres. Four counties had over 10,000 acre increases in grasshopper infestation (Juab, Millard, Sanpete and Washington). Mormon Crickets infested acreage decreased by 241% over the past year, total infested acreage was 37,567 acres.





Photo: Nantasha Wright, Bugwood.org



### Light Brown Apple Moth (LBAM)

The Light brown apple moth is native to Australia, and its distribution also includes parts of Europe, India, Oceania and Hawaii. USDA APHIS PPQ assesses this pest to have severe consequences on mainland USA if established. In March 2007, the first find of LBAM occurred in California. Since then, trapping has confirmed LBAM in several California counties. The map above shows the suitable habitat for this species, which includes most of Utah. This species feeds on over 150 plant species, including many fruits, trees and ornamental flowers. In addition to being a leaf-roller, which makes the larvae harder to kill with sprays, this insect has developed resistance to chemical treatments. The larvae destroy or stunt seedlings, spoil the appearance of ornamental plants, and injure tree fruits, with heavy infestations causing up to 75% loss. In warmer climates there can be four generations per growing season. UDAF began trapping for LBAM in 2008, 66 traps were set throughout the state at nurseries and public gardens with high volumes of imported plant materials. No LBAM was detected. Trapping in 2009 will target nurseries throughout the state.



Photos: Scott Barlow

Photos: Danielle Downey, UDAF

Photos: www.wildbiology.com

### Apiary Program

Utah, the 'Beehive State' is home to approximately 350 registered beekeepers who produce over a million pounds of honey each year. Although this crop is sweet, the most valuable service these beneficial insects provide is pollination, which connects them intimately to our food supply. There are currently more difficulties than ever with bee health; numerous parasites and diseases, mysterious symptoms of collapsing colonies, and complex environmental pressures like habitat loss and exposure to pollutants and pesticides. In addition, the industry has become mobile to provide pollination services, each year over 1000 truckloads of bees pass through Utah on their way too and from pollination contracts. To protect and support bees and the industry, UDAF monitors transport of bees through its ports to protect against new pest introductions. UDAF also coordinates with the County Bee Inspectors, who inspect colonies and assist beekeepers regularly. In 2008, inspectors visited approximately 3500 of Utah's 25,000 colonies, and fewer than 1% had diseases of concern. Each year UDAF provides assistance through disease diagnosis and education events for beekeepers through state and local beekeeping associations, focusing on identification and remedies for colony health problems. Through media contacts and general public inquiries (approximately 300 calls/year), UDAF raises awareness about the importance of beekeeping for ecosystems and food security. UDAF also serves the beekeeping industry by reaching over 1000 individual pesticide applicators each year through a continuing education lecture "How to Protect Pollinators from Pesticide Poisoning".



### Apple Maggot and Cherry Fruit Fly

The apple maggot (*Rhagoletis pomonella*), also known as the “railroad-worm”, and the cherry fruit fly (*Rhagoletis indifferens*), are both picture-wing flies native to North America. Both insects have become a major pest of fruit trees in the U.S. and Canada. This UDAF program began in 1985 with the discovery of Apple Maggot in abandoned and non-commercial cherry orchards in Utah County. Approximately 600 traps are monitored during the growing season, and apple maggot catches have decreased from over 60 in 1994 to less than 10 in 2002 and 0 in 2007 and 2008.

There are more than 300 commercial fruit growers in Utah, with a commercial value of more than \$18 million annually. All fruit marketed for export must be free from all apple maggot and cherry fruit fly injury, so thorough and effective control measures are necessary. *All western states have apple maggot and cherry fruit fly quarantines*, and this program allows Utah fruit growers in to export fruit to states with this quarantine.

In addition to trapping, this program provides commercial growers with information to improve insecticide spray timing. Accurately timed sprays result in better control, but also fewer insecticides being used with less harm to the environment and lower production costs. Without proper control, these insects could cause serious damage to all tree fruit grown in the state.

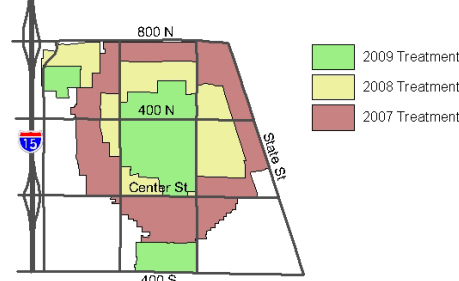


Timeline	Detection traps (# JB)	Delimiting traps (# JB)
1993-2006	481 (1, at airport)	0
2006	481	100 (671)
2007	2300	700 (2157)
June-Aug 2007: treated 480 acres of turf & 500 acres foliage		
2008	2386	1085 (100)
June-Aug 2008: treated 326 acres of turf & 753 acres of foliage		
2009 (plan)	2386	1085
June-Aug 2009: will treat 100 acres of turf & 100 acres of foliage		

### Japanese Beetle (JB)

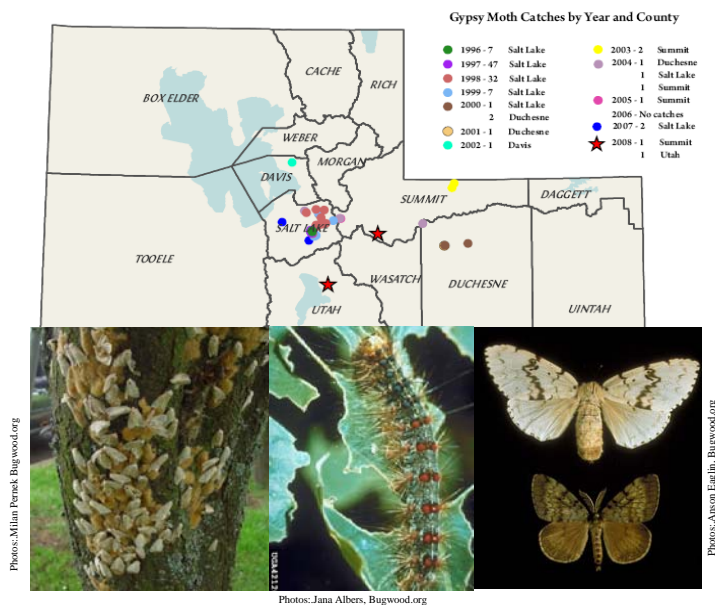
The Japanese Beetle has swept through most of the Eastern US. It is a highly ruinous plant pest causing damage and increased control costs. Adults attack more than 300 species of plants, including numerous trees, ornamental shrubs, vines, fruits, flowers, vegetables, garden crops, weeds, and field crops. Larvae are serious pests of lawns, other grasses, and nursery stock. Because the larvae is easily shipped with nursery stock and soil, JB is a serious threat to Utah’s \$124 million nursery and floriculture economy and has been part of UDAF detection trapping since 1993. When a JB infestation was discovered in Orem, Utah in 2006, the infestation was delimited using pheromone baited traps, and an eradication plan was devised. The eradication approach was based on containment, trapping, turf and foliar treatments. Partnerships were established with Orem City Mayor, County Commissioners, APHIS PPQ, Orem residents, EPA, health officials, extension agents, nurseries, and landscapers using media and open house events to educate and prepare the community for eradication efforts. In 2007, delimiting traps were established and treatments were applied to turf and foliage in and around the infested area. In 2008, treatments were applied again to a reduced infested area, and the number of adult beetles trapped was reduced by 95%. The 2009 treatment area will be smaller still, and trapping will remain high until JB is eradicated.

### Orem JB Treatment Area 2007-2009





## State of Utah Gypsy Moth Catches 1996 - 2008



## Gypsy Moth (GM)

Gypsy Moth (*Lymantria dispar*) is established in the Eastern US, and since their egg masses are laid on virtually any substrate, they are often moved long distances to new territory. Utah's arid climate and mountainous terrain have a high potential for Gypsy Moth infestation and subsequent mass deforestation. Since Utah is not part of the contiguous range of Gypsy Moths in the Eastern US, a program of Gypsy Moth prevention and eradication is the most cost effective and beneficial strategy. GM was first found in Utah in 1988. Since that time UDAF has been the lead agency in the administration of a major survey and control program. When populations are found, they can be treated and effectively eradicated before damage occurs. UDAF has successfully eradicated GM twice using the bacterium *Bacillus thuringiensis* var. *kurstaki* (Btk) and continues to monitor for new introductions. The 2008 Utah Gypsy Moth Program placed 2654 detection and delimiting traps using the GMWest model BioSIM. This model integrates climate and elevation data to predict the probability of GM establishment. Two male moths were caught in 2008, one in Kamas and one in Orem. Both locations will be trapped to delimit in 2009. From 2000 to 2008 the GM detection program has trapped 15 single males in individual pheromone traps, and in every case further delimitation surveys have produced negative results.

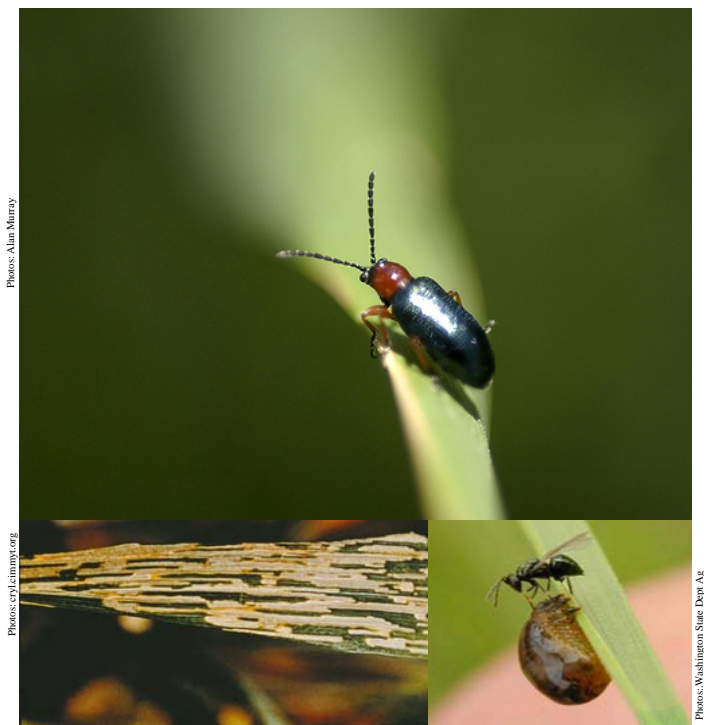
Year	Traps Placed	Acres Sprayed	Moths Caught
1988	1,737	0	925
1989	5,398	1,190	2,274
1990	7,469	20,064	577
1991	7,818	29,925	192
1992	10,588	15,718	94
1993	10,126	5,135	5
1994	4,035	0	0
1995	1,680	0	0
1996	1,964	0	7
1997	2,954	0	47
1998	4,599	916	32
1999	5,461	764	7
2000	6,905	0	3
2001	5,046	0	1
2002	3,812	0	1
2003	3,534	0	2
2004	3,270	0	3
2005	2,917	0	1
2006	3,055	0	0
2007	2,535	0	2
2008	2,654	0	2



## Asian Defoliator

Several species of Asian defoliators have been spread to Europe and caused severe damage there. These species are not yet established in North America, but analysis of their climatic and habitat needs shows that they are considered serious threats to the United States. These species cause dramatic devastation across landscapes by defoliating many tree species, mostly conifers but also deciduous species. The forests and climate of Utah are suitable habitat. These insect adults are known to migrate long distances and the egg masses are easily transported on nearly any substrate including vehicles, trailers and containers. Using pheromones for these specific pests, UDAF traps for early detection of Nun moth (*Lymantria monacha*), Siberian Silk Moth (*Dendrolimus superans sibiricus*), Rosy (Pink) Gypsy Moth (*Lymantria Mathura*), and Asian gypsy moth (AGM) (*Lymantria dispar*).

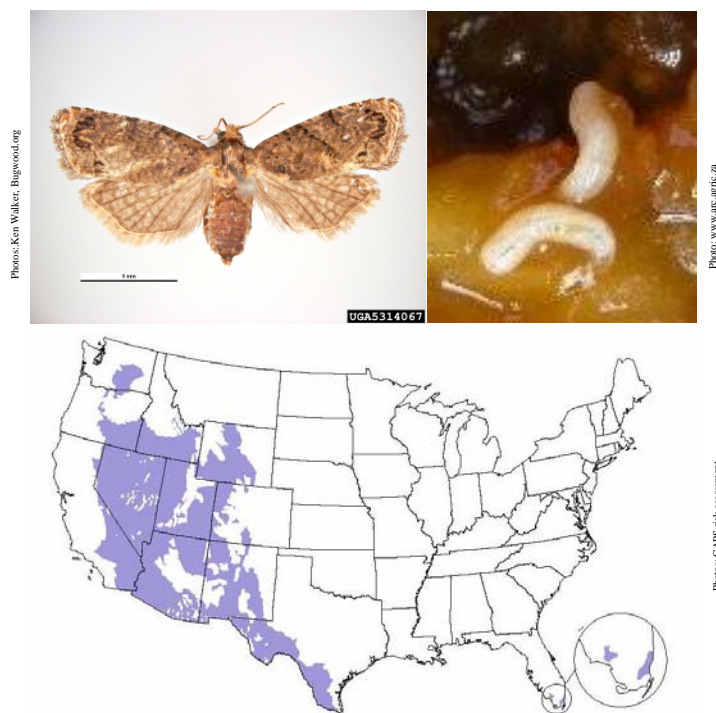
Traps were baited with pheromones for target species, and placed in high-risk areas of the state. Shipping vectors such as railroads and highways, and landing points including airports and military bases were trapped. Traps were set for each species statewide, including 25 traps for Asian gypsy moth, 100 traps for Siberian silk moth, 53 traps for Nun moth and 53 traps for Rosy gypsy moth. None of these species were detected.



### Cereal Leaf Beetle (CLB)

The cereal leaf beetle (*Oulema melanopus*), has been spreading across the U.S. for about 50 years. In Utah, it was first recognized in Morgan County in 1984, where it was causing economic damage on barley, oats and wheat. Since then, it has infested the cooler, moister counties in Utah. In 1984, UDAF began annual statewide surveys for this pest in part to satisfy the requirements of the California Cereal Leaf Beetle Quarantine, so that Utah growers could export hay and cereal to California. In 2008, the survey was scaled back to include only Utah's counties with hay and cereal export potential. The cereal leaf beetle prefers irrigated fields of oats, wheat and barley. Using standard USDA methods and a sweep net, a total of 195 locations in 39 field sites were surveyed throughout six counties. Four of these counties (Millard, Iron, Washington and Beaver) have no record of CLB presence, and they continued to be free of CLB in 2008. Only three sites were positive for CLB- two in Sanpete and one in Box Elder County, where CLB was present in the past.

In general, CLB levels were lower than in years past, probably due to successful release of a biocontrol agent, *Tetrastichus julis*, which parasitizes and kills the CLB larvae. UDAF cooperated with Utah State University to rear and release this biocontrol species, and the 2007 CLB survey determined that all counties positive for CLB also had substantial levels of these parasites. In general, the parasite population stays highest when growers tolerate sub-economic levels of CLB to harbor parasite populations.



### False Codling Moth (FCM)

False codling moth, *Thaumatotibia leucotreta*, feeds on over 70 plants, it is a significant pest of fruit trees and field crops in Africa. Native to Ethiopia, FCM is present in much of Sub-Saharan Africa. Climates suitable for this pest vary from tropical to dry or temperate. This pest is not established in the US, but each year, there are 80-100 interceptions nationwide, largely associated with airline traffic and ports of entry. Based on the classification of climate zones, 20% of the United States represents suitable habitat for this pest. Much of the suitable habitat within the United States falls within Utah's borders (Figure above).

High risk crops in Utah include fruit trees and corn. In addition, several wild plants native to Utah are possible hosts. Utah's fruit industry is valued at more than \$18 million annually, and corn is a \$31 million industry; both would be significantly damaged by false codling moth infestation.

This pest could be introduced in a variety of ways, but most likely by importing infested plant materials. In 2008, 165 traps were placed in 20 Utah counties, targeting high risk areas such as nurseries, airports, bonded warehouses and pathways of imported products. Zero catches of the false codling moth occurred in 2008.





### Exotic Wood Borer and Bark Beetle Detection

Utah's wood products industry is valued at \$329 million per year, and its ornamental industry adds another \$43 million. Both of these industries would suffer considerable losses if exotic forest insects became established in Utah. UDAF performed a survey for invasive wood boring bark beetles and long horned beetle with funding provided through the Cooperative Agricultural Pest Survey Program (CAPS) which is administered by United States Department of Agriculture (USDA), Animal Plant Health Inspection Service (APHIS), Plant Protection Quarantine (PPQ), and USDA Forest Service Early Detection and Rapid Response (EDRR) Program. Further cooperation was provided by the Port of Salt Lake Customs and Border Protection. These pests are of economic importance due to their ability to damage urban and natural forests, commercial forest and orchard industries. The risk of introduction is great considering the increased demand for inexpensive commodities from the continent of Asia. The pests are introduced from wood packing material and other raw products; tile, stone, and dunnage brought in by sea containers to the state via railroads and trucks.

Trap sites were selected in areas that receive raw or unrefined products, wood packing materials, or are prior interception locations. In 2008, 25 trap sites were chosen throughout 12 counties. Each site contained three Lindgren funnel traps baited with a-pinene, *Ips* complex, or ethanol lures. Each trap was collected several times and screened for target species or species of interest. Specimens were first screened by UDAF and then verified by Josh Vlach, Jim LeBonte, and Rick Wescott of Oregon Department of Agriculture. Traps were very productive and identifications are pending.



### Emerald Ash Borer (EAB)

Emerald ash borer is native to Asia, but it was discovered in Michigan in 2002, and since then it continues to spread to states in and around the great lakes region. It was probably introduced by way of wood packing materials from Asian cargo. EAB quickly killed many millions of ash trees in these areas, and can now be easily spread from infested areas by transporting infested trees, logs or firewood. In its native ecosystem in Asia, this insect exists in balance with competitors, and natural predators and pathogens. It does not cause economic damage in this setting. However, in North America, without these balancing factors, EAB has caused rapid death to all ash species it attacks. Symptoms include crown dieback initially, which progresses until the tree is bare. Epicormic shoots, splitting bark, increased woodpecker damage, serpentine galleries and D-shaped exit holes are the following symptoms of EAB infestation.

In addition to Utah's many ornamental ash trees in urban landscapes, there are two native ash species that are part of the forest ecosystem. All of these species would be vulnerable to EAB attack, causing economic and aesthetic losses in urban areas and ecological impacts in natural areas. In 2008, UDAF placed 38 baited traps in 17 counties, targeting high risk ash trees in decline. No EAB was detected.



Photos: Clemson University, USDA Extension

Photos: Clemson University, USDA Extension

Photos: William Lambert, Bugwood.org

## European Corn Borer

This highly adaptable pest attacks over 200 plant species. During its early history in the United States, the European corn borer spawned one generation yearly. By the late 1930's, a two-generation per annum European corn borer mushroomed swiftly and became dominant in the central Corn Belt. It continued spreading in all directions, with the southernmost populations spawning 3 and 4 generations per year. UDAF administers a quarantine for small grains and other agricultural crops that may contain the European corn borer to prevent this destructive insect from entering Utah.

UDAF, in association with the United States Department of Agriculture (USDA), launched a European corn borer trapping program. This program consists of approximately 100 traps placed each year in chief corn producing areas of eight counties. The counties included are Cache, Box Elder, Weber, Davis, Utah, Sevier, Sanpete, and Emery. No new records of the European corn borer were found in Utah in 2008.



Photo: Bernd Fransen, Bugwood.org

Photo: Biologische Bundesanstalt für Land und Forstwirtschaft, Bugwood.org

Photo: Paolo Mazzoli, Bugwood.org

## Exotic Pest Detection

The Egyptian cottonworm (*Spodoptera littoralis*), and the Silver Y moth (*Autographa gamma*) both have the potential to infest many crop and horticultural systems in Utah. Both feed on hundreds of plant species, and most importantly they both feed on alfalfa, the most economically important crop in Utah (over 2 million tons harvested in 2007 worth more than \$308 million). Although wild populations of these moths have not been identified in the United States, Egyptian cottonworm is established in the Mediterranean, the Middle East, and in most of Africa. With at least seven generations per year in its native habitat, the adults are well-known for their migratory potential. Also known as the African cotton leafworm, this invasive species has been accidentally imported with cultivated plants in the United Kingdom. The larvae can feed on many different vegetables, fruits and greenhouse plants. On most crops, Egyptian cottonworm larvae can completely devour leaves and cause a severe yield reduction if left untreated. Silver Y moth is commonly found in Europe, Asia, and northern Africa. Like Egyptian cottonworm, it is a generalist feeder and its larvae destroy foliage by skeletonizing leaves. Both of these species have a high risk of economic impact in Utah, so they are part of the UDAF early detection and eradication strategy.

UDAF cooperates with Utah State University to place traps for these species at nurseries throughout the state. In total, 66 sticky cards baited with specific pheromones were placed in greenhouse and nursery locations. Neither species was detected.